CHARACTERISTICS LISTED IN CHARTS

STATUS	O-operational system, number in parentheses denotes the approximate date that the system went on the air. D-system under development with anticipated date that operations will begin.
TYPE	G-general purpose, S-special purpose.
COMPUTER	manufacturer's name and number of central computers in system.
LANGUAGES	basic languages available on system at present.
TERMINALS	type of terminal equipment available, number of such terminals in parentheses. Code: TT followed by number denotes TELETYPE terminals and model number, TY-typewriter, TLX-Telex console, CRT-cathode ray tube display, BR-Bunker Ramo series 200 display consoles, IBM 1050, 2741-keyboard consoles, IBM 2250, 2260, PHILCO-display consoles, PLT-Plotter.
MAIN STORAGE	first number denotes total core storage *in words* on system, second number in parentheses, if given, denotes maximum core storage available to an individual user.
SECONDARY STORAGE	DR-magnetic drum, DK-disk file, DC-data cell, MT-magnetic tape, CORE-bulk core, CF-random access card file (K = 1024, M = 1,000,000 wds. per unit).
NO. OF USERS	maximum number of users who can operate simultaneously at any given time.

A WORD ABOUT COMPUTER RESEARCH CORPORATION

Computer Research Corporation provides consulting, research, engineering and programming services leading to the effective use of computers as problem solving tools. As specialists in the man-machine partnership, we strive to make men more productive as they pursue intellectual and administrative activities.

Our work for major business, industrial and Government organizations has taught us that the proper role of a consultant is to work himself out of a job. We make our clients self-reliant which is why they continue to use our services.

COMPUTER RESEARCH CORPORATION
429 Watertown Street
Newton, Massachusetts 02158
Tel. (617) 969-7150

COMPUTER RESEARCH CORPORATION

TIME-SHARING SYSTEM SCORECARD

A SURVEY OF ON-LINE MULTIPLE USER COMPUTER SYSTEMS

Fall 1967 **No. 5**

This guide is prepared periodically to keep the reader abreast of the rapidly increasing number of time-shared computer systems which are bringing man and machine together in close partnership for the pursuit of intellectual and administrative activities. By glancing at the following charts the reader can judge for himself the progress which is being made in this new and dynamic field. There are several different definitions of time-sharing. No single definition is adequate for all purposes. We have limited this survey to systems which have at least two independent, remote and simultaneously operable consoles (from the user's point of view). If the language capabilities of the system are extensive and general so that a user can create new languages while working on-line, we have denoted this as a general purpose time-sharing system. Where the language capabilities are more restrictive, permitting the user to work in only one specific problem area, we have used the term special purpose time-sharing system.

The number of commercial and research time-sharing systems has grown so rapidly in the past several months that it is no longer possible to list each individual system in a brochure of this size. Therefore, we have listed only the first or major occurrences of any time-sharing system which operates on a particular type of computer.

Information concerning the number of users that can be handled by any particular time-sharing system has been supplied by the organization involved. In some cases the numbers may be unduly optimistic but we have let the data stand as supplied.

RECENT DEVELOPMENTS

The continued growth of commercial time-sharing is perhaps the most striking feature in this edition of the scorecard. Almost every major city in the country now has local access to at least one time-sharing service. Most organizations that now offer service are expanding geographically and several new companies are entering the scene. In addition, specialized time-sharing services are beginning to emerge such as the financial analysis service by White, Weld & Co. which will be built upon an SDS 940. Meanwhile, General Electric's MEDINET division has started to offer time-shared service to some hospitals in Massachusettts and New York on an experimental basis.

It is interesting to observe the almost universal slippage in the development of the newer time-sharing systems. Project MAC which expected to be in normal operation with a time-shared GE 645 in June of 67 now estimates that it will be operational in the summer of 68. Performance of the IBM 360/67 has also been disappointing, and some organizations that originally hoped to be operational by this time have declined to make any further predictions as to when their time-sharing capability will be fully realized. The SDS 940 which was reported as a fully operational 32 user system some time ago has also been beset by software problems. SDS now estimates a 32 user capability in March of 1968.

New machines that have been announced with a time-sharing capability include the Digital Equipment Corp. PDP-10, the RCA 70/46 and the Burroughs 5500.

RESEARCH ORIENTED TIME-SHARING SYSTEMS

Prepared by COMPUTER RESEARCH CORPORATION

ORGANIZATION	STATUS	TYPE	COMPUTER(S)	LANGUAGE(S)	TERMINALS	MAIN STORAGE	SECONDARY STORAGE	NO. OF USERS	REMARKS
Bell Telephone Laboratories [1] Murray Hill, New Jersey	D (1/68)	G	GE-645 [2]	FORTRAN IV, COBOL, PL/1, SNOBOL	TT-37 IBM 1050 CRT (10)	256K	DK (40M Wds.) DR (4M Wds.) Tape Loop (100M Wds.)	100	Highly interactive system for research and production computing.
Bolt Beranek and Newman Inc.[3] Cambridge, Mass.	O (6/64)	G	PDP-1D [4]	MIDAS, TELCOMP [5]	TT-33 (90)	24K (4K)	DR (128K Wds.) DR (2 units, 25M Wds. each) MT (2 units)	64	Medical information and communications system for hospitals. Also used for computational and data management facility.
C. S. I. R. O. Canberra City, Australia	O (7/66)	G	CDC 3600	CIDER, INTERP, STATIST, 3600 FORTRAN, COMPASS	CDC 210 (6) CDC 250	32K (2K)	DR (2 units, .5M Wds. each unit) DK (12.5M Wds.) MT (8)	7	General purpose scientific computations.
Dartmouth College [6] Kiewit Computation Center Hanover, N. H.	O (9/67)	G	GE-635 DATANET-30 (4)	BASIC, ALGOL-35 (1/68) FORTRAN (1/68)	TT-35 (55)	64K (24K)	DR (768K Wds.) DK (2 units, 4M Wds.) MT (6 units)	200	Datanet-30's have 16K core memory each. Educational and research use.
Edinburgh University Department of Machine Intelligence and Perception Edinburgh, Scotland	O (6/67)	G	Elliot 4120	POP-2	TT (20)	32K (16K)		8	POP-2 language suitable for list processing and numerical computation using FORTRAN type statements.
General Electric Research & Development Center Schenectady, New York	O (7/66)	G	GE-265	BASIC, ALGOL, FORTRAN, LISP and others	TT (45) CRT (3)	16K (6K)	DK (20M Char.) MT (6 units)	21 (TT) 3 (CRT)	Uses include: scientific programming, data acquisition from experiments, system programming development.
Lawrence Radiation Laboratory University of California Livermore, California	Partial O (7/67) Complete D (6/68)	G	PDP-6 (2) CDC 7600 CDC 6600 (3) CDC 3600 IBM-7030 IBM-7094 (2)	FORTRAN, LISP, Assembly Languages	TT (200) PLT (10)	256K[6] Words	DK (8×10^8 bits) DC (3.2×10^9 bits) Photo-Digital Store (1×10^{12} bits)		Use is mostly scientific computation.
Lincoln Laboratory — MIT Lexington, Mass.	O (2/66)	G	TX-2	CORAL, VITAL, MARK 5, LABGOL	TY (5), CRT (4), RAND TABLET, PDP-338 Remote Terminal	105K	DR (20M Wds.)	6	System features fast response time for on-line graphical communication.
Lincoln Laboratory — MIT Lexington, Mass.	O (9/67)	G	IBM 360/67	MACRO Assembler FORTRAN IV	IBM 2741 (30)	128K	DR (1M Wds.) DK (56M Wds.)	20	Establishment of a large computational facility for scientific and engineering research.
Lockheed Georgia Co. Marietta, Georgia	O (7/65)	G	IBM 360/50	FORTRAN IV	IBM 1050 (36) IBM 2200 (6)	64K (20K)	DK (6.45M Char.)	42	System named RAX, developed from earlier 360/40 system, used mostly for engineering.
Lockheed Palo Alto Research Laboratories Palo Alto, California	O (12/66)	S	IBM 360/30	360 Assembly Language (7/68)	IBM 2260 (4) Sanders 720	64K Bytes	DK (2 Units, 2.75 M Bytes each) DC (418M Bytes) MT (1 Dual)	12	System named LACONIQ. Information retrieval and updating, research.
MIT Dept. of Civil Eng. Cambridge, Mass.	D (6/68)	S	IBM 360/40	COGO, STRUDL, ICETRAN	IBM 2741 (5)	128K Bytes	DK (2)	10	System named ICES. Uses include Engineering, Science, Management.
MIT Dept. of Electrical Eng. Cambridge, Mass.	O (5/63)	G	PDP-1	Macro Assembler	TY (5)	12K (8K)	DR (88K Wds.)[7] MT (6 Units)[8]	5	Experimental time-sharing system for student use in thesis and research projects.
National Bureau of Standards Washington, D.C.	O (4/66)	G	MOBIDIC B [2]	DESCAL CL6, CAS, EDIT	TT-33, 35 (4) CRT	16K (6K)	DK (1M Wds.) MT (4 Units)	6	Uses include research in the design of on-line systems and terminals.
Northern Electric Co., Ltd. Research & Development Laboratories Ottawa, Ontario, Canada	O	G	CDC 3300 (2)	FORTRAN, PL/1, COBOL, COMPASS	TT (70) 8130 (4)	82K 65K (4K)	DK (12 Units, 8.2 M Char. each) MT (10 Units)	35	Scientific and Business use.
Ohio State University Columbus, Ohio	D (9/68)	G	IBM 360/50 IBM 360/75	PL/1, FORTRAN IV	IBM 2741 (20) IBM 2260 (8)	512K Bytes 1024K Bytes	DR (1 Unit) DK (1 Unit)	14	
Perkin Elmer Corp. Norwalk, Conn.	O (10/67)	G	SDS-9300 SDS-930	SPEED (Text Editor), FORTRAN IV, META-Symbol, SLIP (12/67)	TT-33, 35 BR IBM 2741 IBM 1050	32K 16K (22K)	DK (67M Char. 1/68) MT (4 Units) DR (4 Units, 8M Char.)	16	Uses include lens design, circuit analysis, scientific engineering and research.
Project MAC — MIT (Phase One) Cambridge, Mass.	O (10/63)[9]	G	IBM-7094	ALGOL[10] FORTRAN, MAD, LISP	TT-35 (54) IBM 1050 (56) TLX (1) CRT (2)	64K (32K)	DK (36M Wds.) DR (.5M Wds.) MT (12 Units)	30	Project MAC is an MIT research program sponsored by the Advanced Research Projects Agency (ARPA), D.O.D., under a contract with the Office of Naval Research.

ORGANIZATION	STATUS	TYPE	COMPUTER(S)	LANGUAGE(S)	TERMINALS	MAIN STORAGE	SECONDARY STORAGE	NO. OF USERS	REMARKS
Project MAC — MIT (Phase Two) **Cambridge, Mass.**	D (1/68)	G	GE-645 [2]	ALGOL,[11] COBOL, FORTRAN IV, PL/1	TT-37 IBM 2741	256K	DK (40M Wds.) DR (4M Wds.) MT (8 Units)	100	Initial limited system operation by early '68. Prototype system by summer of '68 with continual development thereafter.
Purdue University **Computer Science Department** **Lafayette, Indiana**	O (9/67)	G	IBM-7094	File Generation, TEXT-90 (12/67), FORTRAN	TT-33 (2) IBM 1052 (2)	32K (16K)	DK (9 Megawords) MT (9 Units)	4	System named PTSS.
RAND Corporation **Santa Monica, California**	O (11/65)	G	PDP-6	JOSS II	TY (30)[12]	32K	DK (6M Wds.) DR (1M Wds.)	30	Interpretive system with compact conversational language for small numerical problems.
Stanford University **Stanford, California**	O (8/64)	G	PDP-1	Assembly Language	PHILCO CRT TT-33, 35	32K (12K)	DR (131K Wds.) DK MT (2 Units)	100	An IBM 360/67 will be operational in 1968.
System Development Corp. **Santa Monica, California**	O (1/64)	G	AN/FSQ-32 PDP-1	TINT, IPL-TS, JOVIAL, LISP	TT-33, 35 TY, CRT, TLX IBM 1052	65K (47K) 16K Buffer	DR (5 Units, 139K Wds. each) DK (1 Unit, 4M Wds.)[13] MT (12 Units)	30	Oriented to command and control experimentation and other general uses.
TRW Systems Group **Redondo Beach, California**	O (1/65)	S	Bunker-Ramo 340	Culler-Fried System for Mathematical Analysis	4 Consoles[14] BBN Console	16K	DR (48K Wds.) MT (2 Units)	4	Highly flexible system for on-line manipulation, specification and execution of mathematical and symbolic operations with graphical display of results.
U.C.L.A. Western Data Processing Center **Los Angeles, California**	O (11/64)	G	IBM-7740 [15] IBM-7040/7094		IBM 1050 (12)	32K	DK DR	12	Jointly financed by UCLA and IBM, system services UCLA and 88 other California schools.
United States Military Academy **West Point, New York**	O (12/65)	G	GE-225 (3) DATANET 30	CADETRAN [16]	TT (15)	8K 16K (6K)	DK (18M Char.) MT (6 Units)	15	
University of California **Irvine, California**	O (1/66)	G	IBM 1410 IBM 1440	JOSSI [5] Coursewriter	IBM 1050 (18)	100K Characters	DK MT (5 Units)		Uses include computer-assisted instruction and the administration of student enrollment.
University of California **Irvine, California**	D (1/68)	G	IBM 360/50	ISIS CAL	IBM 2741 (28) IBM 2260 (3)	512K Bytes (8K Bytes)	DK (12 Units 7.25 M Bytes each) MT (4 Units)		Instruction, Administration and Research.
University of California **Project GENIE** **Berkeley, California**	O (4/65)	G	SDS-930	FORTRAN II, ALGOL, LISP, SNOBOL, CAL, DDT, QED, ARPAS, QSPL	TT-33 (8) TT-35 (8) CRT (2) DATAPHONE (6)	48K (38K)	DR (1.3M Wds.) MT (2 Units) DK (144M Wds.)	16	Features hardware address mapping. The SDS 940 system is based on the results of this ARPA sponsored project.
University of California **Santa Barbara, California**	D (1/67)	G	IBM 360/50	Culler-Fried System, FORTRAN IV	20 Consoles[14] RAND TABLET IBM 1050 (3)	64K	4 DK (1.8M Wds.) DR (1M Wds.) Core (.5M Wds.)	16	Extension of the Culler-Fried system now operating on the RW400. The 360/50 system has simultaneous background processing.
University of Illinois **Urbana, Illinois**	O (1/66)	G	ILLIAC II PDP-7	FORTRAN	TT-33, 35 (8) CRT	8K (6K)	DK (10M Wds.) DR (64K Wds.)	7	Experimental time-sharing system for general university research.
University of Massachusetts **Amherst, Mass.**	O (9/67)	G	CDC 3600 PDP-8/680	BASIC, SNOBOL, COGO, SMALL, FORTRAN IV	TT-33, 35	32K (8K)	DR (2 Units, 2M Char. each) DK (2 Units, 8M Char each) MT (4 Units)	32 [17]	Uses include education and varied research programs in diverse fields.
University of Pennsylvania **Philadelphia, Penn.**	O (6/65)	G	IBM-7040 PDP-8	FORTRAN, MULTI-LANG, MAP, ALGOL, LISP, SNOBOL	TT-35 (4) BR (2)	32K (24K)	DK MT (6 Units)	6	Uses include information retrieval, research, and multiprogramming experimentation.
University of Pittsburgh **Computer Center** **Pittsburgh, Penn.**	O (3/66)	G	IBM 360/50	ALGOL, PIL,[18] FORTRAN IV, PL/1 (1/68), Assembler	IBM 1050 (3) IBM 2741 (20)	128K Bytes, 1M Bytes LCS (32K Bytes)	DK (2 Units, 7.5M Bytes)	24	General University research and education. Online LINC-8 for medical research available in late 1967.
University of Utah **Salt Lake City, Utah**	D (12/67)	G	UNIVAC 1108	FORTRAN V, TRAC, COBOL, ALGOL	TT-35 (20)	131K (65K)	DR (6 Units, 1.5M Wds.) MT (8 Units) FASTRAND II	20	Plans include the addition of more displays and bulk core memory.

NOTES

1. Development in cooperation with Project MAC, Massachusetts Institute of Technology.
2. Multiple processor time-sharing system.
3. Developed with the Massachusetts General Hospital under contract from the National Institutes of Health.
4. Based upon an earlier 5-station PDP-1 System operational 9/62.
5. Based on the RAND JOSS language.
6. The 256K core storage applies only to the PDP 6's.
7. To be replaced by a larger model early in 1968.
8. Units have been installed but are not operational.
9. Initially time-shared in 1961 at the M.I.T. Computation Center.
10. Other languages include FAP, SLIP, COGO, SNOBOL, STRESS, GPSS, COMIT, OPL-1, and OPS-3.
11. Most Project MAC Phase I languages will be implemented later.
12. Selectric with JOSS keyboard and paging.
13. Additional unit available in January of 1968.
14. Each console consists of two keyboards and a storage tube display.
15. System currently utilizes five computers in addition to central 7740.
16. Cadetran is an extended teaching dialect of FORTRAN.
17. 64 with added communications ports.
18. Based on the RAND JOSS language.

COMMERCIAL TIME-SHARING SYSTEMS

Users can purchase remote, on-line and interactive computer services from the organizations listed below.

ORGANIZATION	COMPUTER	CONVERSATIONAL LANGUAGES	TERMINALS	NO. OF * USERS	MINIMUM CHARGE PER MONTH	AVG. CHARGE PER TERMINAL HR.	CHARGE PER MIN. OF CPU TIME	DISC § STORAGE/ CUSTOMER
Allen-Babcock Computing, Inc. **Palo Alto, California**	IBM 360/50 [1]	PL/1 (on-line subset)	IBM 2741 TT-33, 35, 37 Friden 7100 IBM 1050	90	$385.00	None	$5-$10 [2]	100K+
Applied Logic Corp. **Princeton, New Jersey**	DEC PDP-6, PDP-10 (12/67) [3]	FORTRAN IV DDT, JOSS MACRO-10 Compact COBOL LISP, SNOBOL-6	TT-33, 35 CRT	30 [4]	None	$5.00	$6.00	0+
Bolt Beranek and Newman Inc. [5] **Cambridge, Mass.**	PDP-7/8	TELCOMP	TT-33	[6]	None	$12.50	None	None
CEIR Inc. **Arlington, Virginia**	GE-235 DATANET-30	BASIC ALGOL	TT-33, 35	40	$250.00	$6.00	None	120K
Computer Sharing Inc. **Bala Cynwyd, Pennsylvania**	SDS 940	CAL, ARPAS, BASIC, DDT, FORTRAN IV, FORTRAN II	TT-33, 35	32	None	$30 [7]	None	60K+
COM-SHARE Inc. **Ann Arbor, Michigan**	SDS 940	BASIC, CAL, FORTRAN IV, SNOBOL, TAP, DDT, FORTRAN II	TT-33, 35	64	$100.00	$10-$20	$2.50	0+
DIAL-DATA, Inc. **Newton, Mass.**	SDS 940	CAL, DDT, QED, FORTRAN II, BASIC, ALGOL, FORTRAN IV, SNOBOL, ARPAS	TT-33, 35	32	$100.00	$13.50	$3.00	60K+
General Electric Co. [8] **Information Service Dept.** **Bethesda, Md.**	GE-235 DATANET-30	BASIC, ALGOL, FORTRAN	TT-33, 35 PLT	40	$100.00	$10.00	$2.40	0+
International Business Machines [9] **New York City**	IBM 7044	QUIKTRAN	IBM 1050 IBM 2741	80	$125.00	$12.50 [10]	None	0+
Intinco Limited **London, England**	UNIVAC 418 (2)	Stockbrokers Language	TT-33 (60)	60	[11]	[11]	[11]	
KEYDATA Corp. (Adams Assoc.) **Cambridge, Mass.**	UNIVAC 491	KOP III	TT-28	200	[12]	[12]	[12]	
Pillsbury Occidental Company [13] **Raleigh, North Carolina**	GE-265	ALGOL, BASIC, FORTRAN	TT-33, 35 PLT, CRT	40	$108.50	$10.00	$3.00	0+
REALTIME Systems Inc. **New York, New York**	B-5500	FORTRAN IV, COBOL, ALGOL	TT, TLX, TWX, CRT	15	$500.00	$15.00	$8.35	0+
TYMSHARE Inc. **Los Altos, California**	SDS 940	CAL, BASIC, QED, DDT, FORTRAN IV, ARPAS, ALGOL	TT-33, 35 PLT	60	$80.00 or $390.00	$13-$16	None	60K+
VIP Systems Corp. **Washington, D.C.**	IBM 1440	IBM Administrative Terminal System	IBM 2741	40	$375.00	$7.50	None	100K+

* In all cases the number of simultaneous users can be increased by addition of equipment or by duplicating the computer system.

§ Number denotes amount allocated in characters or bytes, + indicetes more available et extra charge.

NOTES

1. Special operation codes for efficient conversetionel interaction added.
2. Dependent on emount of core used.
3. This new system will be in operation early in 1968.
4. Will be increased to 40 in lete Jenuary.
5. Systems located in Cembridge, Massachusetts, East Orenge, New Jersey, and London, England.
6. Cembridge and East Orenge handle 32, London handles 16.
7. For first 20 hours, $25/hour thereafter.
8. Service available from offices loceted in 33 major metropolitan arees.
9. Other systems in Chicago, Clevelend, Philedelphia, Los Angeles, and Toronto.
10. For first 5 hours, $11 for hours 6 thru 75. $9 thereafter.
11. A cherge of approximately $5,000 per yeer plus a usage charge of $.05 per inquiry.
12. For accounting and manegement uses. Charges on besis of message trensmissions, processor time end storage used.
13. Trede neme Call-A-Computer.